EFFECTIVENESS OF VISUAL SUPPORT CUES IN INDICATION OF TOILET NEEDS AMONG CHILDREN WITH AUTISM

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CERTIFICATE

This is to certify that the research work entitled **"EFFECTIVENESS OF VISUAL SUPPORT CUES IN INDICATION OF TOILET NEEDS AMONG CHILDREN WITH AUTISM"** was carried out by **Ms. K. ALLI (Reg.No.41091028), KMCH** College of Occupational Therapy, towards partial fulfillment of the requirements of Master of Occupational Therapy (Advanced OT in pediatrics) of the Tamilnadu Dr. M.G.R. Medical University, Chennai.

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I thank my mother, and my brothers who have always been a source of encouragement. Their sacrifices and support helped me to accomplish my project.

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ABSTRACT

AIM:

To determine the effectiveness of visual support cues in indication of toilet needs among children with autism.

METHODOLOGY:

20 Children with autism having problem in indicating toileting were selected for the study based on the assessment. The assessment tool, modified baseline chart was used as pre and post test score. 9 children were received visual cue training who were in experimental group and 10 children were not given any intervention which formed the control group. Post test was taken, after 4 weeks of intervention by asking the parents to fill the modified baseline chart schedules. The result was obtained by comparing the pre test and post test scores.

RESULT:

Manual statistical method was used to analyze the study result. Odd's ratio was used to analyze the effectiveness of visual cue training. The result showed the Odd's ratio value is 0.01 which is lesser than 1 it indicate the event is occur less likely in the control group, that mean the control group children indicates urination very less than experimental in the post test.

CONCLUSION:

The study concluded that visual support cues in indication of toilet among the children with autism have a considerable effect in indicating toileting in children with autism.

Introduction

INTRODUCTION

The autistic disorders are early onset conditions characterized by delay and deviance in the development of social, communication and other skills. In contrast to the lack of interest in the social environment, unusual sensitivity to the inanimate environment is expected. This might include various motor mannerisms (stereotypes), resistance to change and idiosyncratic interest and pre-occupations (**Kaplan).** Wing and potter (2002) compared 39 epidemiological studies based on the criteria used for diagnosis and concluded that the mean rate of ASD in studies using the DSM-IV or ICD- 10 criteria was **21.0/10,000**. Recent studies have estimated prevalence of autistic children to be approximately 6.6 per 1,000(or 1/150) children in the United States and as many as 12 in 1,000(or 1/1800) children with an ASD in Europe and Scandinaria. In India prevalence rate was estimated as 13.8 percent among children 0 to 3 years.

Toilet training is the mastery of the skills necessary for urinating and defecating in a socially acceptable time and manner. The age at which toilet training is carried out is determined by culture. Some culture train children at a very early age. This training focuses on cognitive development of children and children's readiness to learn the complexity of the task. Cognitive development is assessed by children's ability to follow certain instructions. Two years of age has suggested as the appropriate age to initiate toilet training. Toilet training usually takes 2 weeks to 2 months to learn, although training may occur in less time, using more intense method, (**Stadler, 1999).**

Toilet training is training an entirely new skill. This works best when steps to the task are organized into simple pieces. Teaching must also be consistent at all times and become predictable to the child in terms of rewards and consequences. For children with communication deficiency visual learning may be an appropriate way to teach toileting skill. It will be important to be read their cues and/or teach a way to express the need or urge to use the toilet.

Many children with autism are difficult to be toilet trained. Even a typically developing child, toilet training is often a difficult skill to master. The objective of toilet training was quickly alleviate the burden of infant wetting and soiling, **(Hagopian, fisher, plaza nd wezbickki 1993, Blum taubman nd osbome 1997).**

The characteristics of autism contribute a child's difficulty in learning to independently use the toilet,

1. The child difficulty with understanding and enjoying reciprocal social relationship interferes with this process.

2. A child with autism usually has significant difficulty organizing and sequencing information and with attending to relevant information consistently.

3. The child's difficulty in accepting changes in his routines also makes toileting a difficult skill to master.

4. A child with autism may also have problems integrating sensory information and establishing the relationship between body sensations and everyday functional activities.

5. A child with sensory integrative dysfunction avoids toilet due to defensiveness.

People with autistic spectrum disorders learn and function more effectively using visual as compared to verbal information **(Quill, 1994, schuler 1995, tubs, 1966).** Research has found that among people with ASD, a characteristic pattern of skill found on Wechsler IQ is having relative or absolute strength on visual- spatial construction (the block design &object assembly subtest) and particularly weakness on verbal and social reasoning (the comprehension test).For many children having a picture of a toilet or potty chair as a cue helps them to go to the toilet. The pictures can be laminated and put on with Velcro or inserted with plastic sleeves so the child can take them off or change the order. This visually helps the child to know what to do, remember what to do and learn from the sequence (**Brazelton et al 1999).**

TEACCH focuses on improving adaptive and independent living skills through modifying the environment to accommodate the characteristics of persons with autistic spectrum disorders. For e.g., visual aids are strongly emphasized where by students use picture schedules and other cues to signal the beginning and ending of the activities, steps in a task, and the sequence of activities in a typical day. When toilet training children with communication, visual learning may be an appropriate way to teach toileting skill, (**Stadler, Gorski. Brazelton. 1999).** Based on these research the current study attempts to find out the effectiveness of visual support cues in indication of toileting in children with autism.

Does visual support cues make the autistic children indicate toileting?

OPERATIONAL DEFINITION

EFFECTIVENESS:

Degree to which the desired result is produce.

TOILET TRAINING:

Toilet training is the acquisition of skills necessary for urinating and defecating in a toilet at a socially acceptable time and age.

VISUAL SUPPORT CUES:

Visual supports described by Hodgdon (1995, 1997), are helping children who do not have conventional communication systems to become more able communication partners

Aim and Objectives

AIM AND OBJECTIVES

AIM:

To determine the effectiveness of visual support cues in indication of toileting needs in children with autism.

OBJECTIVES:

1. To identify children with communication problem in toileting.
2. To establish record of toileting (Voiding).
3. To introduce visually supported cues for intervention.
4. To reduce accidents.

Hypothesis

HYPOTHESIS

HYPOTHESIS:

Visual support cue will have an effect on indication of toilet needs among children with autism.

Related Literature

RELATED LITERATURE

Autistic disorder also known as childhood autism, infantile autism, and early infantile autism, is by far the best known of the pervasive developmental disorders. In this condition, there is marked and sustained impairment in social interaction, deviance in communication, and restricted or stereotyped patterns of behavior and interest.

DSM-IV-TR CRITERIA FOR AUTISTIC DISORDER:

I. A total of six (or more) items from (1), (2), and (3), with at least two from (1) and one each from (2), and (3).

1) Qualitative impairment in social interaction, as manifested by at least two of the following:

   (a) Marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body postures and gesture to regulate social interaction.

   (b) Failure to develop peer relationships appropriate to developmental level.

   (c) A lack of spontaneous seeking to share enjoyment, interest, or achievements with other people (e.g., by a lack of showing, bringing, or pointing out objects of interest to other people)

2) Qualitative impairments in communication as manifested by at least one of the following:

   (a) Delay in or total lack of, the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gestures or mime)

   (b) In individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others

   (c) Stereotyped and repetitive use of language or idiosyncratic language.

(d) Lack of varied spontaneous make-believe play or social imitative play appropriate to developmental level.

3) Restricted repetitive and stereotyped patterns of behavior, interest, and activities, as manifested by at least one of the following:

(a) Encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus.

(b) Apparently inflexible adherence to specific, non-functional routines or rituals.

(c) Stereotyped and repetitive motor mannerisms (e.g. hand or finger flapping or twisting, or complex whole body movements).

(D) Persistent preoccupation with parts of objects.

II. Delays or abnormal functioning in at least one of the following areas, with onset before age 3 ,1) social interaction,(2)language as used in social communication, or(3)symbolic or imaginative play.

III. This disturbance is not better accounted for by Rett's syndrome or childhood disintegrative disorder.

PROBLEMS OF AUTISTIC BEHAVIOR:

Characteristics triads of symptoms are impairment in social interaction, impairment in communication and restricted interest and repetitive behavior,

SOCIAL DEVELOPMENT:

Social deficits distinguish autism and the related autistic spectrum disorder from other developmental disorders people with autism have social impairments and often lack the intuition about others that many people take for granted unusual social development becomes apparent early in childhood. Autism infant show less attention to social stimuli ,smile and look at others less often , and respond to their own name .Autistic toddlers differ more strikingly from social norms and more likely to communicate by manipulating another person's hand. Three to five year old autistic children are less likely to exhibit social understanding , approach others

spontaneously , imitate and respond to emotions , communicate non-verbally and take turns with others **{VolkmarF,klinaA nd et al.,}**

COMMUNICATION:

About a third to a half to a half of the individual do not develop enough natural speech to a half of the individuals do not develop enough natural speech to meet their daily Communication needs. Difficulties in communication may be present from the first year of life and may include delayed onset of babbling unusual gestures, diminished responsiveness, and vocal patterns that are not synchronized with the caregiver. In the second and third years autistic children have less frequent and less diverse babbling consonant, words, and word combinations, their gestures are often integrated with words. Autistic children are less likely to make request or share experiences and are more likely to simply repeat others words or reverse pronouns. {**LandaR,Tager FlusbergH, CaronnaE}**

REPETITIVE BEHAVIOR:

Autistic individuals display many forms of repetitive or restricted behavior which the repetitive behavior scale- revised{RBS-R} categorizes as follows, stereotype behavior is repetitive movement such as hand flapping , making sounds , head rolling or body rocking.

Compulsive behavior is intended to and appears to follow rules such as arranging objects in stacks or lines. Ritualistic behavior consists of an unvarying pattern of daily activities, such as an unchanging menu or a dressing ritual. Restricted behavior is limitation in focus, interest or activity. Self injury includes movements that injure or can injure the person, hand biting and head banging**. {Lams KSL, Aman mg nd etal}**

ACQUISITION OF DEVELOPMENTAL AGE FOR TOILETING SKILLS:

A more recent study by **schum et al., (2002)** which looked at the age of attainment of toileting skills, showed that average age at which children first reported either during or after passing urine was around 30 months for girls and 34 months for boys. The average age at which they remained dry during the day was 32 months for girls and 35 months for boys.

Janson et al., (2005) reported the median age for dryness during the day was 3.5 years and the median age for night time dryness was 4 years. Night time dryness appeared to come 10 months after the child had become dry in the day. Just under a third of children (31%) developed the ability to recognize the bladder signals at 2 years old, 79% at 3 years and 100% at 4 years. However becoming fully trained involves more than just the ability to recognize the bladder and bowel signals.

The frequency of voiding varies between individuals with normal range varying from four to nine episodes per day in children aged 2-3 years and five to seven episodes per day in a 10myear old **(Bloom et al).**

TOILET TRAINING:

One of the most important skills we need to learn how to use toilet successfully and independently. Wetting and soiling clothing results in significant amount of time, energy and resources being devoted to an individual's personal care needs. Wet or soiled clothing or poor toileting hygiene can also interfere with social acceptance. Person with autism have been reported by researchers as being the most difficult population to toilet train.

Communication plays a major role in the toilet training process when an individual relies on caretakers to assist with accessing facilities. Additionally effective communication must take place in order to teach someone the steps involved in toileting. When planning intervention, keep in mind the tendency for persons with autism to interpret the language in a very literal and concrete manner {**Maria Wheeler**}.

The specific characteristics that impede autistic children's independent use of the toilet are autistic children often do not feel pleasure from making their parents and teachers happy. Difficulties in comprehending language and logic may inhibit the ability to understand what is expected in regards to the toilet procedure. Furthermore autistic children attachment to routines and resistance to change may make the transition from diapers to the toilet difficult. They may be attached to the sensation of wearing diapers having used them daily for 2-4 years. They may not like the stimulating environment of the bathroom with its bright light, echoes and sounds of running and flushing water and they may be adverse to change in temperature they feel when they take off their clothes **{Boswell and Gray, 1995}.**

Autistic children's toilet training can be further impeded by their idiosyncroctic relationship with their bodies. They may not know how to read bodily cues and therefore not aware of urge to use toilet {Hagopian, Fisher 1993}. All of these factors contribute the need for adaptation of classic toilet training methods to suit the special needs of autistic children.

CHARACTERISTIC OF AUTISM THAT INFLUENCE TOILET TRAINING:

COMMUNICATION NEEDS:

Communication plays a major role in the toilet training process when an individual relies on caretakers to assist with accessing facilities. Additionally, effective communication must take place in order to teach someone the steps involved in toileting.

SENSORY ISSUES:

Sensory issues also affect response to toilet training. The degree of awareness of one's own bodily changes related to elimination. Sensitivity to tactile stimulation from clothing and environmental stimulation (flushing can provide excessive stimulation to the senses) in the bath room, all influence the effectiveness of toilet training.

PREFERENCES FOR ROUTINE OR RITUAL:

Preference for routine and ritual can be used as a strengths to build upon, turning toileting into a regular routine difficulty adjusting behaviors to fit a new situations , such as using a different toilet in a new environment , can often be remediated by creating rituals that serve as a bridge between the old routine and new situations. Also, these routines and rituals can be used to present toileting skills as a sequence of steps to provide the necessary sequential learning.

LIMITED IMITATION:

Learning through imitation has significant limits, however imitation can be a powerful strategy for teaching new skills or behaviors. When using any form of imitation, rely on effective communication strategies to direct attention to the specific behaviors to imitate.

MOTOR PLANNING DIFFICULTIES:

Success with toileting can also be influenced by motor planning difficulties when an individual experiences problems planning and producing the physical movements required to perform a particular behavior, accessing and using the toilet unassisted can become over helming challenge.

All of the characteristics described can result in increased levels of anxiety, frustration and confusion related to toilet training. These feelings are often expressed in the form of misbehaviors that appear to resistance to using the toilet or remaining continent careful analysis of these characteristics plays an integral role in successfully teaching toileting.

TEACCH METHODS:

TEACCH stands for treatment and education of autistic and related communication handicapped children and is a highly effective way to work with autistic children .The concept of structure has been fundamental to the TEACCH program's approach to working with individual's with autistic spectrum disorder since its beginning. The use of structure has continued to evolve in the four decades since the Schopler was initially funded and TEACCH method of working with individuals with autism spectrum disorders(ASD) has come to be called structured teaching (**schopler, Mesibov, and Hearsely 1995**).

APPLYING STRUCTURED TEACHING PRINCIPLES TO TOILET TRAINING:

Structure with in the TEACCH program refers to active organization and direction of the physical environment and sequence of activities. Structure is essential to the functioning of individuals with autism spectrum disorders (ASD) because of the major difficulties with conceptual and organizational skills. **Scopler, Brehm, Kinsbourne and Reicher (1971**) demonstrated that children with autism displayed more appropriate behaviors in structured than in unstructured conditions**.** In thinking about setting up a program to help a child learn to toilet independently, the first TEACHH recommendation would be to try to look at the problem from the perspective of the student with autism. Another TEACHH recommendation would be to build in many elements of visual structure to help the child understand exactly what is expected. Look

at each element of structured teaching to decide how visual supports can be added to build positive routines, clarify expectations and reduce confrontational situations.

ELEMENTS OF STRUCTURED TEACHING:

The elements of structured teaching are organization of physical environment, a predictable sequence of activities, visual schedules routines with flexibility, work/activity systems, and visually structured activities. Structure teaching is the term given to a set of teaching or support tools designed by TEACHH for people with autism. These tools are responsive to the characteristics of autism using their strong learning modalities {visual and motor skills and enjoyment of routine} to build bridges over some of the gaps in learning caused by their characteristic deficits. Structured teaching not only increases the learning of new skills but also serves to increase independence and self-esteem, reducing behavior problems that result from confusion, anxiety, and over – stimulation. Structured teaching combines the use of individualized assessment, establishment of proactive and adaptive routines, and the systematic use of visual supports to support learning {**GaryB.Mesibov, victoria shea, Eric schopler, Brazelton)**

VISUAL SUPPORT CUES:

A visual cue is a set of pictures that communicates a series of activities or the steps of a specific activity. Visual cues are meant to help children understand and manage the daily events in their lives. Visual cues may be created using photographs, pictures, written words, or physical objects. Ideally, they communicate clear expectations for the child and decrease the need for constant adult involvement in the activity. Most visual cues are introduced with adult guidance that gradually decreases with time **{Bopp, K.D., et al. 2004}.**

Children with autism frequently have trouble paying attention to, adapting to, and understanding auditory input. They also tend to have strengths in rote memory and the ability to understand visual information. Visual cues take advantage of these strengths by efficiently communicating information that allows children to better predict and plan within their environment. The research and clinical literature also indicates that people with autistic spectrum

disorder learn and function more effectively using visual as compared to verbal information (**Quill 1997, Schuler 1995, Tubbs 1996).**

Most behavioral problems associated with children with autism seem to stem from poor communication. While visual cues can be useful at home, they may be especially useful for children transitioning into a school environment. Visual cues facilitate communication and therefore may minimize behavioral problems **{Bryan, L.C., and D.L. Gast 2000**}.

Review of Literature

REVIEW OF LITERATURE

DEVELOPMENTAL SKILLS OF VOIDING

Goellner, MH zieglerEE, **Fomonsj**. has conducted a study on Voiding during first three years of life says that with increasing age mean urine volume increased and also urine volume was correlated with volume of intake. This study evaluates urine volume, voiding frequency and voiding size of normal children during the first 3 years of life.

Sequential Acquisition of Toilet-Training Skills: A Descriptive Study of Gender and Age Differences in Normal Children a study conducted by **Timothy R.Schum, MD, Thomas M.Kolb,Bs, et al.,** The objective of this study is to compare the ages, by gender, at which normally developing children acquire individual toilet-training skills and to describe the typical sequence by which children achieve complete toileting success. The author found that Girls demonstrated toilet-training skills at earlier ages than boys. Indicating a need to go to the bathroom developed from 26 to 29 months. There was marked similarity in the sequences in which girls and boys achieve individual skills. They concluded girls achieve nearly all toilet-training skills earlier than boys, including successful completion.

Toilet training methods, clinical interventions, and recommendations a study conducted by **Ann C. Stadler, MSN, CPNP and et al.,** mentioned that Toilet mastery is truly a developmental milestone in a child's life it is a time when children are discovering and enhancing their physical disabilities, understanding and responding to relationship dynamics and confronting and reacting to external pressure.

PROBLEMS OF AUTISTIC CHILDREN:

Nancy j. Dalrymple and Lisa A.Ruble has done a study on Toilet training and behaviors of people with autism-1992. This investigation surveyed 100 parents of people with autism of a mean age of 19.5 years. The average duration of urine training was 1.6 years, bowel training 2.1 years. On the average training started more than 21/2 years before the age of diagnosis of autism. Reinforcement was used by 78% of parents of male and by 100% of parents

of female. This study found that lower cognition and lower verbal skills are significantly correlated with age of accomplishment of urine and bowel training.

A review article from the text **Toilet training the autistic child** was published by **Jonathan Sullivan**., says that when communication is a problem as with most autistic children, letting an adult know you need to use the bathroom can be almost a impossible endeavor. Repeated routine behavior will make the child adapt to that behavior. The autistic children do not have the skills and sometime to imitate and mimic a behavior.

RISK FACTORS:

Carol Joinson, PhD[1]et al has conducted a study on **Early Childhood Risk Factors Associated with Daytime Wetting and Soiling in School-age Children in 2008** this is a longitudinal study based on a UK population of over 10,000 children from age 4 to 9 years. Parents completed questionnaires on child development (at 18 months); child temperament (24 months); maternal depression/anxiety (21 months), and parenting behaviors (24 months). The analysis examined whether these risk factors distinguish between children with normal development of daytime bladder control and those with delayed acquisition of daytime continence; persistent daytime wetting/soiling, and relapse in wetting/soiling. Results say that Delayed development, difficult temperament, and maternal depression/anxiety were associated with an increase in the odds of experiencing problems with bladder control. The author concluded that early childhoods are associated with a subsequent increase in the odds of children experiencing daytime wetting and soiling at school age.

ASSESSMENT:

A review article from the Text **Pediatric assessment of toilet training readiness and the issuing of products**- Royal college of nursing was published by **June Rogers et al.,2006** has says some standardized baseline schedule to assess the children. Before beginning assessment, a baseline record should be taken of the child's bowel and bladder habits. In order to help plan a toileting programme and also to identify if there are any underlying problems, families should be asked to complete the toileting chart. He also mentioned the main aim of the bladder assessment is to identify the bladder that is able to complete a normal maturation cycle.

Azrin et al., 1971 suggested a number of training protocols begin an individual's pattern of elimination including frequency and timing of voids.

READINESS CUES:

A review article from Text **potty training children with special needs** was published by **Vincent Ianneli** in 2004 says that signs of physical readiness is important for toilet training , physical readiness signs include facial expressions, posture or by what he says, staying dry for at least 2 hrs at a time and having regular bowel movements. Signs of intellectual and psychological readiness includes being able to follow simple instructions and being cooperative, being uncomfortable with dirty diapers and wanting them to be changed, recognizing when he has a full bladder or needs to have a bowel movement, being able to tell you when he needs to urinate or have a bowel movement, asking to use the potty chair, or asking to wear regular underwear. The author also mentioned the things to avoid when toilet training the child and help prevent resistance, are beginning during a stressful time or period of change in the family (moving, new baby, etc.), pushing your child too fast, and punishing mistakes.

A review article from the text **toilet training** was published by **Blum et al**. says that by the 1940s it was hypothesized that rigid toilet training resulted in the failure to achieve bladder continence and that it may elicit behavioral problems .In addition, research had shown that children do not develop voluntary bladder control until approximately 9 months of age. Toilet training reverted to a child-oriented approach and parents were advised to begin toilet training once the child displayed interest in the process. In 1962 Brazelton developed the "child readiness" approach. This was followed by the Azrin and Foxx method that focused on structured behavioral endpoint oriented training. As toilet training moved from rigid parent-driven methods to child-oriented ones, the age at which toilet training was initiated increase.

INTERVENTION:

Haruhiko Ando has conducted a study on Training autistic children to urinate in the toilet through operant conditioning technique – 1974. The purpose of this study was to evaluate the use of operant conditioning techniques to toilet train children in an autism ward of a hospital for developmentally disturbed children. Five profoundly retarded males with clear clinical

manifestations of autism were selected as subjects. Records of the voiding behavior of these subjects were kept during a baseline period and throughout the application of procedures. Appropriate voiding behavior was immediately followed by positive reinforcers, such as candy, verbal praise, and physical affection. Inappropriate voiding behavior was immediately followed by negative reinforcers, verbal as well as physical. The results of this study show that operant conditioning techniques can be used to change the voiding behavior of profoundly retarded autistic children even where other methods have failed.

A study on cues was published by **Robert L. Koegel nd Haunelore wihelm**, in aug-2004 this study concluded that autistic children appear to have difficulty responding to multiple cues even when both cues are in the same modality.

A review article from challenge of potty training by **Maureen bennie** says Autistic children tend to be very visual so offering them visual supports is important. Using picture symbols going through each step of going to the potty is helpful.

A study conducted by **Terry P. Klassen.,etl on The Effectiveness of Different Methods of Toilet Training for Bladder Control** says that Both the Azrin and Foxx method and the child-oriented approach resulted in quick, successful toilet training, but there was limited information about the sustainability of the training. The objective of child-oriented control. Learning this control is a major developmental task and proper timing may enable a child to master the acts for him or herself. Training must proceed slowly to allow for periods of negativity that are common in this age group. The objective of Azrin and foxx method to teach child to toilet him/herself without reminders or assistance. Training begins at about 20 months of age. The researchers assessed the bladder control, physical development and ability to follow instructions to see if child has developed sufficiently to acquire toilet training skills. The two methods were not directly compared; thus, it is difficult to draw definitive conclusions regarding the superiority of one method over the other. In general, both programs may be used to teach toilet training to healthy children. The Azrin and Foxx method and operant conditioning methods were consistently effective for toilet training. Programs that were adapted to physically handicapped children also resulted in successful toilet training.

In 2006 **wheeler JJ and carter sl** have published a study on **Using Visual Cues in the Classroom for Learners with Autism as a Method for Promoting Positive Behavior,** this paper examines the use of visual schedules for promoting consistency and communicating schedule activities to children with autism and also the use of visual schedules for promoting on-task behavior and decreasing challenging behavior in a 6-year old child with autism. Prior to the study, the boy experienced difficulties in working independently, anticipating and accepting transitions, and communicating. The authors found that the use of visual cues increased the child on-task behavior and improved performance, as measured on a standardized development scale.

In 2006., Bryan, LC, and Gast DL have published a study on **Teaching On-Task and On-Schedule Behaviors to High-Functioning Children with Autism via Picture Activity** Schedules, One of the main goals when teaching children with autism is to decrease dependence on adults.. This article reports the results of a study designed to evaluate the effectiveness of graduated guidance and visual activity schedule in teaching young students with autism. The results suggest that visual schedules are an important means of promoting independent functioning of students with autism and increasing on-task behavior. The authors noted that the students were motivated and enthusiastic about using their visual schedules.

In 2009 **West** published a study, **Picture cues during therapy may help children with autism learn and perform tasks**. Children with autism learn to independently perform tasks by getting instruction from others, and then moving to cues or reminders of what they are supposed to do. Verbal and picture cues have been used during therapy to help the children work by themselves as they learn a task. This study looked to see which worked better: picture cues or verbal cues. The study also tested whether the learning lasted and was generalized over several therapy sessions. Four children (3-6 years old) were taught a new task using the two different cues during several therapy sessions. Three children learned a task using the visual cues, while the fourth child was successful with verbal cues. The results showed that most of the children with autism were good at learning from pictures

In 2002 **Frank R. Cicero and Alpfadt** has done a study on **Investigation of reinforcement based toilet training for children with autism**, in his study he says effectiveness of a reinforcement based toilet training intervention was investigated with three

children with a diagnosis of autism. He found that this procedure is an effective and rapid method of toilet training which can be implemented within a structured school setting with generalization to the home environment.

A. Randi Post, Michael A. Kirkpatrick has conducted a study on **toilet training for a young boy with pervasive developmental disorder in 2004** says that they employed a variation of the Azrin-Foxx (1971) procedure with a 3.5-year-old boy diagnosed with Pervasive Developmental Disability (PDD). Unique features of the study included tailoring to the in-home environment, training without systematically increasing fluid intake, introduction under circumstances that facilitated generalization and transfer without special procedures, the elimination of some specialized equipment, and use of social and activity reinforces. Training was successful and was reported to have generalized to the inclusive school environment.

G S MacDuff, P J Krantz, et al has conducted a study on **Teaching children with autism to use photographic activity schedules: maintenance and generalization of complex response chains** – 1993. This study used a graduated guidance procedure to teach 4 boys with autism to follow photographic activity schedules to increase on-task and on-schedule behavior. The multiple baseline across participants design included baseline, teaching, maintenance, re sequencing of photographs, and generalization to novel photographs phases. The results indicated that photographic activity schedules (albums depicting after-school activities) produced sustained engagement, and skills generalized to a new sequence of photographs and to new photographs. The acquisition of schedule-following skills enabled these children with severe developmental disabilities to display lengthy response chains, independently change activities, and change activities in different group home settings in the absence of immediate supervision and prompts from others.

A study conducted by **Tsuey- ling lee** on **TEACCH supported individualized education program in mentally retarded children and autistic children, in national Hsin-chu University of education**, the researcher examine the TEACCH program in three case studies, one of whom has mental retardation and two of whom have autism. Observation, interviews, records and IEP (individualized education program) were used for eliciting the student's present level of performance and unique needs. One of the objectives was, use a card

and/or picture to indicate his needs to use the toilet and reduce the accidents. Result of this study indicates that, this objective was achieved as 75% by the child.

Conceptual Framework

CONCEPTUAL FRAMEWORK

Toilet training is the acquisition of skills needed for urinating and defecating in a toilet at a socially acceptable time and age. It is a complex process influenced by many physiological, psychological, social, and cultural factors. Complex muscular physiological functions regulate bladder and bowel function. Because the infant's central nervous system is not completely developed, the bladder empties involuntarily as a result of spinal reflexes approximately 20 times a day. As children grow, they gain the ability to recognize that their bladder is full and to retain urine until it is appropriate to void.

The two primary toilet training methods used in western societies are the child- oriented method and Azrin and Foxx method. Both method conclude that toilet training commence at approximately 18 months of age and that the child should be successfully toilet trained between 2 to 3 years of age.

Azrin and Foxx method is a parent – oriented method, emerged in 1970's, emphasizes structured behavioural endpoint training aimed at eliciting a specific chain of independent events by taking the component skills of toilet training.Their method described the first set of objective criteria parents could use to determine if their child was ready for toilet training. The component skills include both physiological readiness (having periods of dryness and being physically able to perform tasks related to toilet training) and psychological readiness (able to follow instructional skills)

This method uses a four step stimulus, control model as follows,

1.Increasing fluid intake
2.Scheduling toilet training time
3.Positively reinforcing correct behavior
4.Over correcting accidents

OPERANT CONDITIONING:

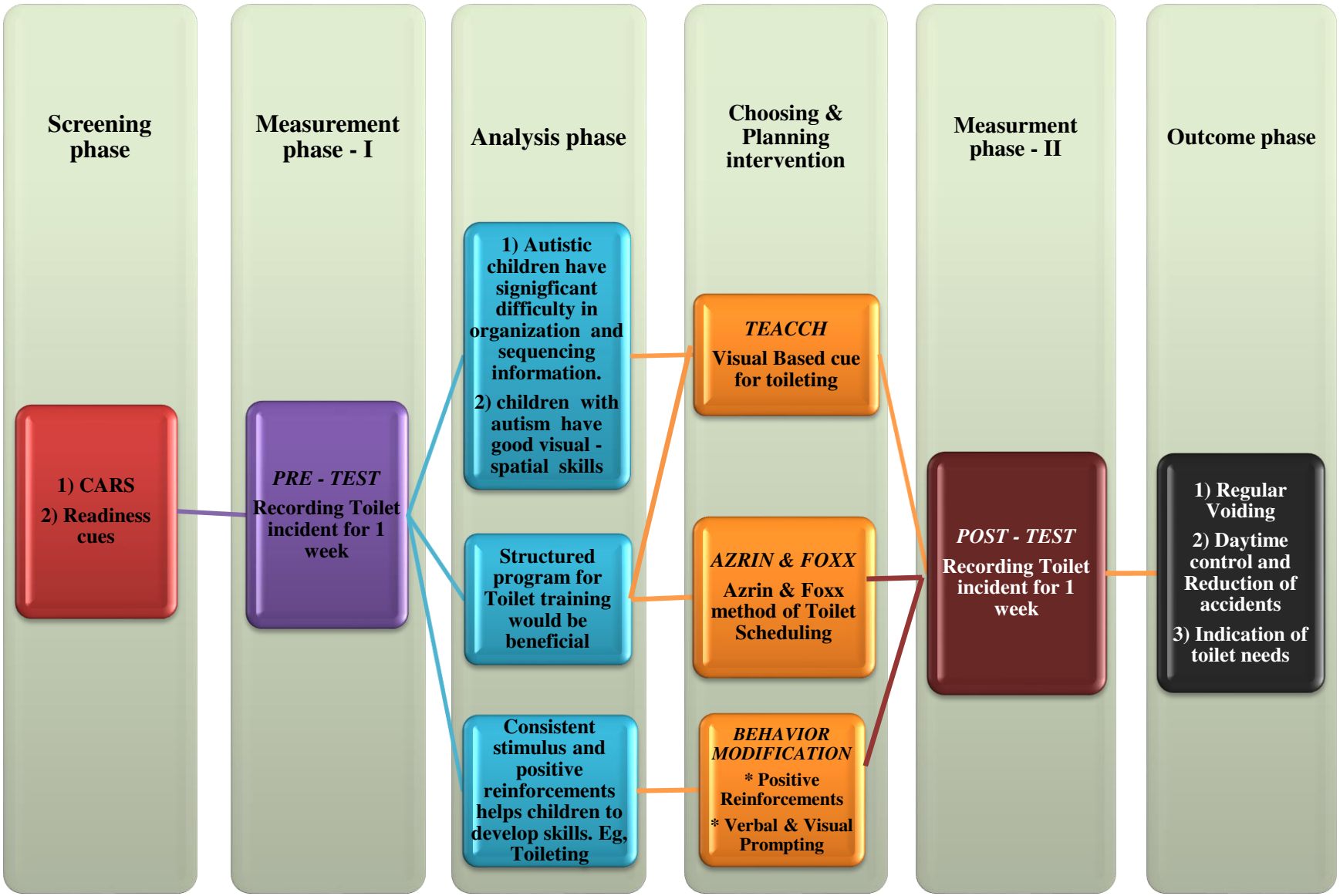
The Azrin and foxx method incorporate operant conditioning, basic operant conditioning techniques have been used to toilet train. The aim of operant conditioning is to establish habits and proper behavior through positive reinforcement with rewards. Common rewards for successfully eliminating in the toilet include parental affection, toys, and candy **(Klassen 2006).**

Literature show that children with autism benefit from structured programs. One such structured programs are provided through TEACCH. TEACCH program is visual based communication for children to communicate with others. Researchers have found that visual spatial skills are highly developed than verbal communication skills for children with autism. Thus to be toilet trained visual based communication for toilet indication would be beneficial in children with autism.

Thus in this study , Azrin and Foxx method of toilet training and TEACCH method of learning and behavior modification of technique were combined with certain alterations. The alterations as follows,

1. The first step in Azrin and Foxx method was modified into monitoring fluid intake time and time of voiding. (This would give an understanding and assist in determining toilet schedules.)
2. The fourth step over- correction was eliminated.
3. Visual support cue (picture of toilet) was used to help children indicate toilet needs.

The following chart explains the approach used for this study.


Screening phase
Measurement phase - I
Analysis phase
Choosing & Planning intervention
Measurment phase - II
Outcome phase
1) CARS
2) Readiness cues
PRE - TEST
Recording Toilet incident for 1 week
1) Autistic children have signigficant difficulty in organization and sequencing information.
2) children with autism have good visual - spatial skills
Structured program for Toilet training would be beneficial
Consistent stimulus and positive reinforcements helps children to develop skills. Eg, Toileting
TEACCH
Visual Based cue for toileting
AZRIN & FOXX
Azrin & Foxx method of Toilet Scheduling
BEHAVIOR MODIFICATION
* Positive Reinforcements
* Verbal & Visual Prompting
POST - TEST
Recording Toilet incident for 1 week
1) Regular Voiding
2) Daytime control and Reduction of accidents
3) Indication of toilet needs

Methodology

METHODOLOGY

The research methods applied by the investigator to test the hypothesis are as follows,

RESEARCH APPROACH:

A qualitative approach was utilized in this study using an appropriate method to quantify the dependent variable.

An experimental approach was used to determine the effectiveness of visual support cues in indication of toileting in children with autism.

RESEARCH DESIGN:

Two groups Pretest-posttest quasi experimental design was adopted for this study

Schematic representation of the study design

	Time period- 1		**Time period- 2**
Test area:	Level of phenomenon		Level of phenomenon
	Before treatment (X)	Treatment	After treatment (Y)
Control Area:	Level of phenomenon	————	Level of phenomenon
	Without out treatment (A)		Without treatment (Z)

TREATMENT EFFECTIVENESS = (Y-X)-(Z-A)

VARIABLES UNDER STUDY:

Independent variable – visual support cue

Dependent variable – Toilet indication

SETTINGS AND DURATION OF THE STUDY:

The study was conducted in KMCH occupational therapy department, Sri prashanthi Academy, Sanjeevani autism centre, Elkon hearing aid centre (Speech &diagnostic centre), Coimbatore. The study was initiated in December 2009 and terminated in November 2010.

POPULATION:

Autistic children who have poor indication of toileting (urine).

SELECTION CRITERIA:

The subjects for the study were based on the following criteria,

INCLUSION CRITERIA:

1. Children should fulfill the criteria for A-DSM-1V.

2. Age group 3- 5 yrs.

3. Child should show some indication of being aware of accidents (e.g. crying, facial expressions).

EXCLUSION CRITERIA:

1. Children with other co-morbid psychiatric and physical disability.

2. Children whose mothers are working women.

3. Mother who have history of physical distress.

4. Autistic children with good communication skills.

SAMPLE SIZE:

20 children were included for this study. Among them, 10 were experimental and 10 were control group.

SAMPLING TECHNIQUE:

Convenient sampling technique was used based on the samples available and children were divided into experimental and control group.

TOOLS USED FOR DATA COLLECTION:

SCREENING TOOL

Childhood autistic rating scale (CARS) used to assess the severity of autism.

ASSESSMENT TOOL:

TOILETING SCHEDULE CHART – MODIFIED BASELINE CHART:

The chart can be used to collect the data needed about the child's readiness. On a routine basis, the child is taken to the bathroom for a "Quick check" every 30 minutes and data is recorded on each occasion. Over a period of 1 week, patterns of data begin to emerge. The data is being collected,

1. Time between the voiding?
2. Number of accidents in day time?
3. Number of indications?
4. Is there some regularity in his wetting or soiling?

PROCEDURE:

- A written consent was assured from the head of the institution to conduct a study.
- The purpose of the study was explained and informed consent was obtained from the parents prior to the study.
- Modified baseline schedules were distributed for 20 parents of autistic children.
- The 20 children were divided into 2 groups: experimental and control, 10 in each.
- Modified baseline schedules were marked by the parents for 1 week and the schedules were collected.
- The bladder tolerance of the child was taken from the modified baseline schedules.

- The intervention was given to the experimental group as follows;
- Visual supported cues (Toilet picture) were distributed to parents of 10 autistic children
- The cues were given 5 minutes before the urinary output, with verbal commands by mother to children (during the sensory readiness cues shown by children)
- The child was encouraged to give the mother and indicate the toileting.
- Intervention was continued for 1 month.
- Post schedules are distributed to the parents of both control and experimental group and data were analyzed.

Data Analysis & Results

Data Analysis & RESULTS

Data was analysed using the manual statistical method.

Analysis was done by using Odds ratio method to compare the pre test and pre test, post test and post test scores of the control and experimental group based on the indication and not indication, toilet and pant to find out the effectiveness of the visual cue based toilet training.

Odd's Ratio

The odds ratio is the ratio of odds of an event occurring in one group to the odds of it occurring in another group

$$\frac{p_1/(1-p_1)}{p_2/(1-p_2)} = \frac{p_1/q_1}{p_2/q_2} = \frac{p_1 q_2}{p_2 q_1},$$

Where $q_x = 1 - p_x$. An odd ratio of 1 indicates that the condition or event under study is equally likely to occur in both groups. An odds ratio greater than 1 indicates that the condition or event is more likely to occur in the first group. An odd ratio less than 1 indicates that the condition or event is less likely to occur in the first group. The odds ratio must be greater than or equal to zero if it is defined. It is undefined if $p_2 q_1$ equals zero.

Table 1: Odd ratio between pre test of the control and experimental group based on the indication and not indication.

Group	Total No of Indication	Ratio of indication	Total No of Not indication	Ratio of Indication & not indication	OD
Control	52	1: 0.154	420	1 : 8.07	7.58
Experimental	8		490	1 : 61.2	

OD – Odd Ratio

This table shows the odd ratio value 7.58 is greater than 1 it indicate the event is occur most likely in the control group, that mean the control group children indicates voiding more than experimental in the pre test.

Graph 1: The total number of indication and not indication of voiding in the pre test of control and experimental group.

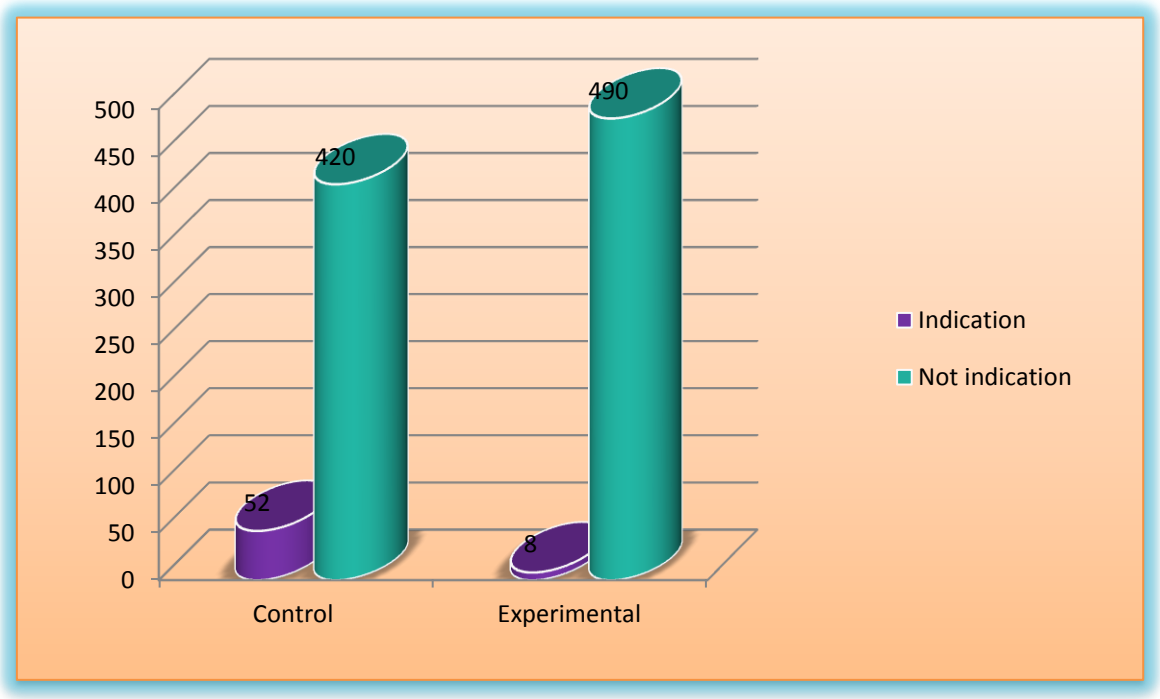


Table 2: Odd ratio between post test of the control and experimental group based on the indication and not indication.

Group	Total No of indication	Ratio of indication	Total No of not indication	Ratio of Indication & not indication	OD
Control	15	1: 25.4	475	1 : 31.67	0.01
Experimental	381		128	1 : 0.03	

OD – Odd Ratio

This table shows the odd ratio value 0.01 is lesser than 1 it indicate the event is occur less likely in the control group, that mean the control group children indicates voiding very less than experimental in the post test.

Graph 2: The total number of indication and not indication of voiding in the post test of control and experimental group.

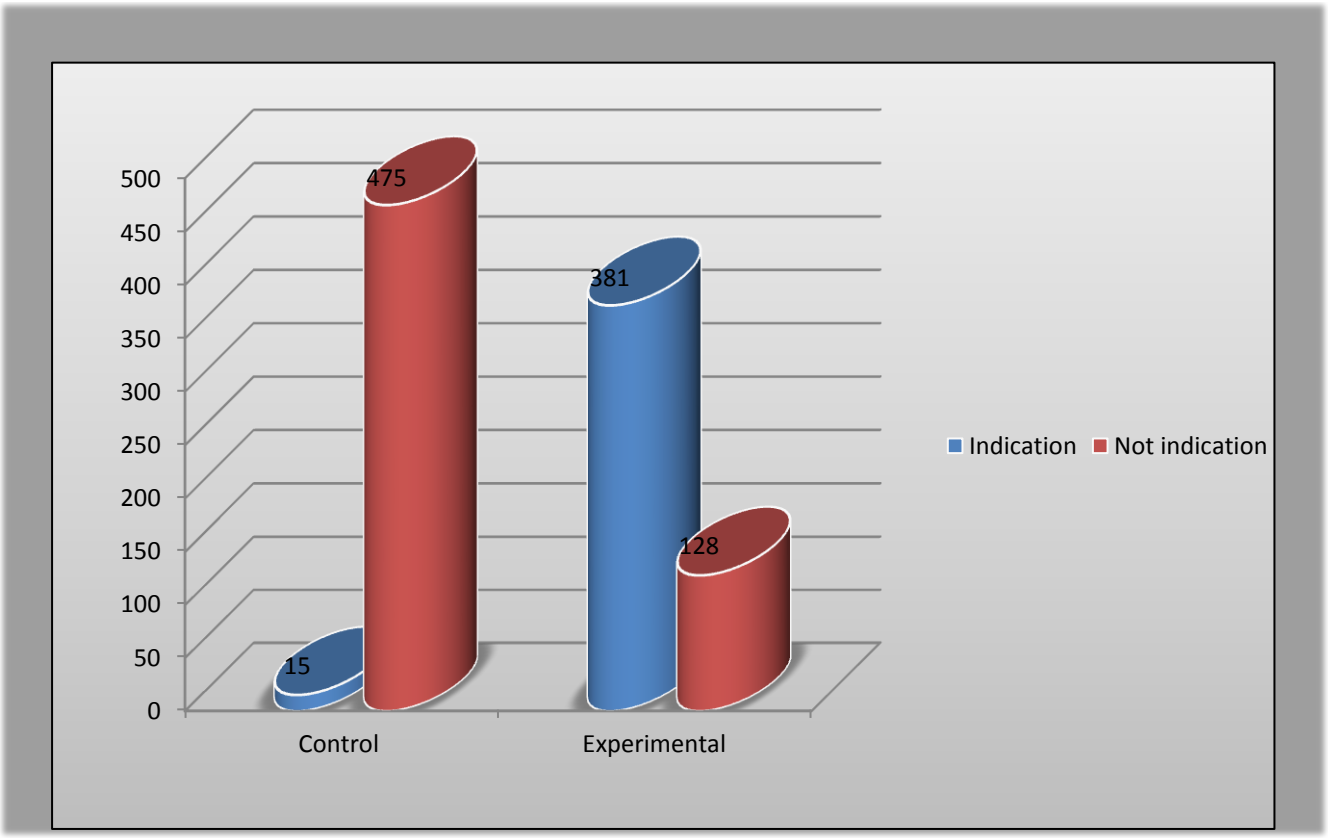


Table 3: Odd ratio between pre test of the control and experimental group based on the voiding on toilet & pant.

Group	Total No of voiding in toilet	Ratio of voiding in toilet	Total No of voiding in pant	Ratio of Toilet & Pant	OD
Control	243	1: 0.897	228	1 : 0.94	1.63
Experimental	218		333	1 : 1.53	

OD – Odd Ratio

This table shows the odd ratio value 1.63 is greater than 1 it indicate the event is occur most likely in the control group, that mean the children who were in control group more often goes to toilet to voiding than the experimental group in the pre test.

Graph 3: The total number of voiding in toilet and pant of the pre test of control and experimental group.

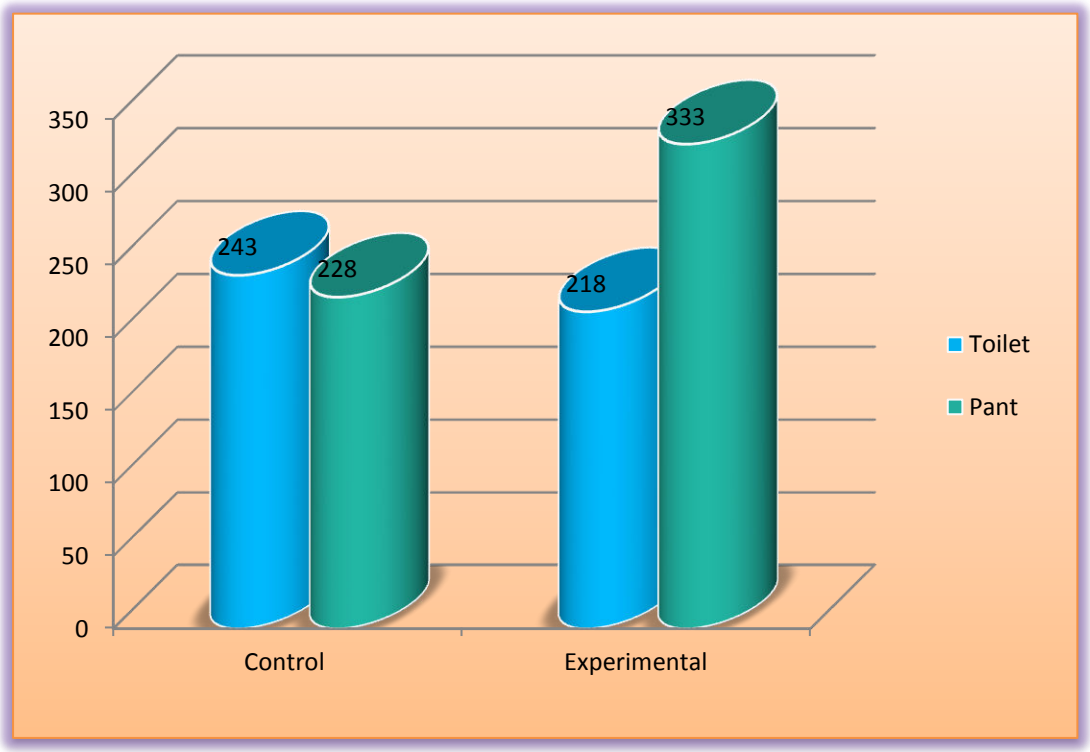


Table 4: Odd ratio between post test of the control and experimental group based on the voiding on toilet & pant.

Group	Total No voiding in toilet	Ratio of voiding in toilet	Total No voiding in pant	Ratio of Toilet & Pant	OD
Control	237	1 : 1.873	243	1 : 1.02	0.12
Experimental	444		53	1 : 0.12	

OD – Odd Ratio

This table shows the odd ratio value 0.12 is lesser than 1 it indicate the event is occur less likely in the control group, that mean the children who were in experimental group more often goes to toilet to voiding than the experimental group in the pre test.

Graph 4: The total number of voiding in toilet and pant of the post test of control and experimental group.

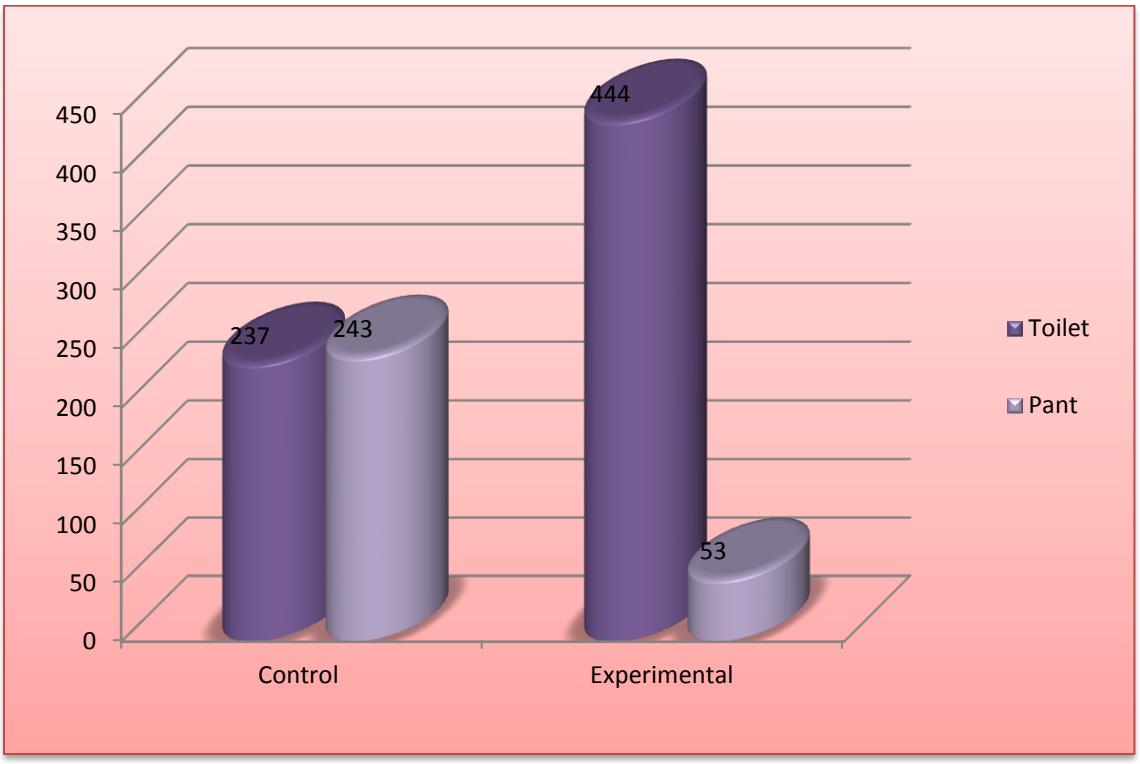


Table 5: The average time interval between the voiding of pre test and post test of control group and experimental group.

Group	Pre test/Post test	Average Time interval between voiding in %					
		0 – 1 Hr	1 – 2 Hr	2 – 3 Hr	3 – 4 Hr	4 – 5 Hr	5 – 6 Hr
Control	Pre test	5.85	30.25	32.4	19.49	6.02	1.43
	Post test	0.89	17.33	52.2	14.39	3.39	0.54
Experimental	Pre test	7.45	39.04	28.7	14.06	4.8	0.76
	Post test	4.76	42.46	25.54	16.93	4.5	2.1

This table showed the time interval between the voiding of pre test and post test of control group and experimental group are mostly in the 1 – 2 and 2- 3 hours of interval, and it showed much differences between pretest and post test of control group, no much changes between the pre test and post test of experimental group.

Graph 5: 1 – 2 hr and 2 – 3 hr of average time interval between voiding of pre test and post test of control and experimental group.

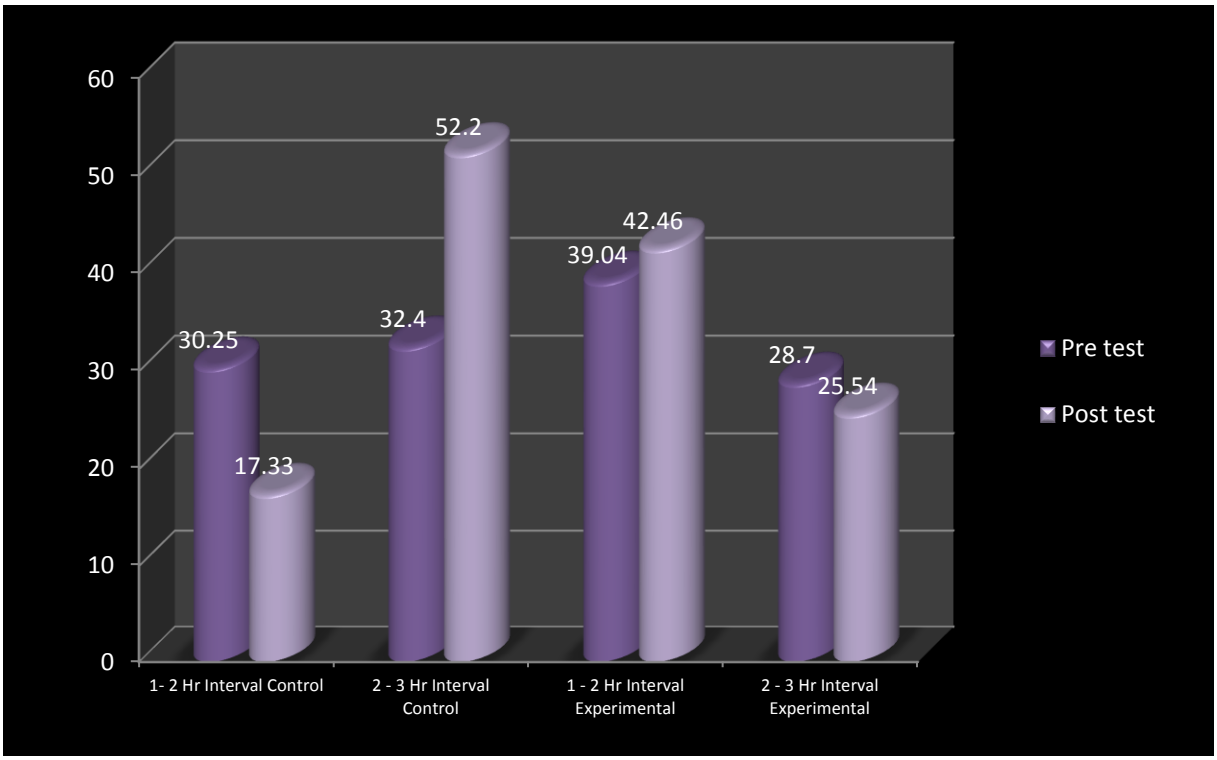
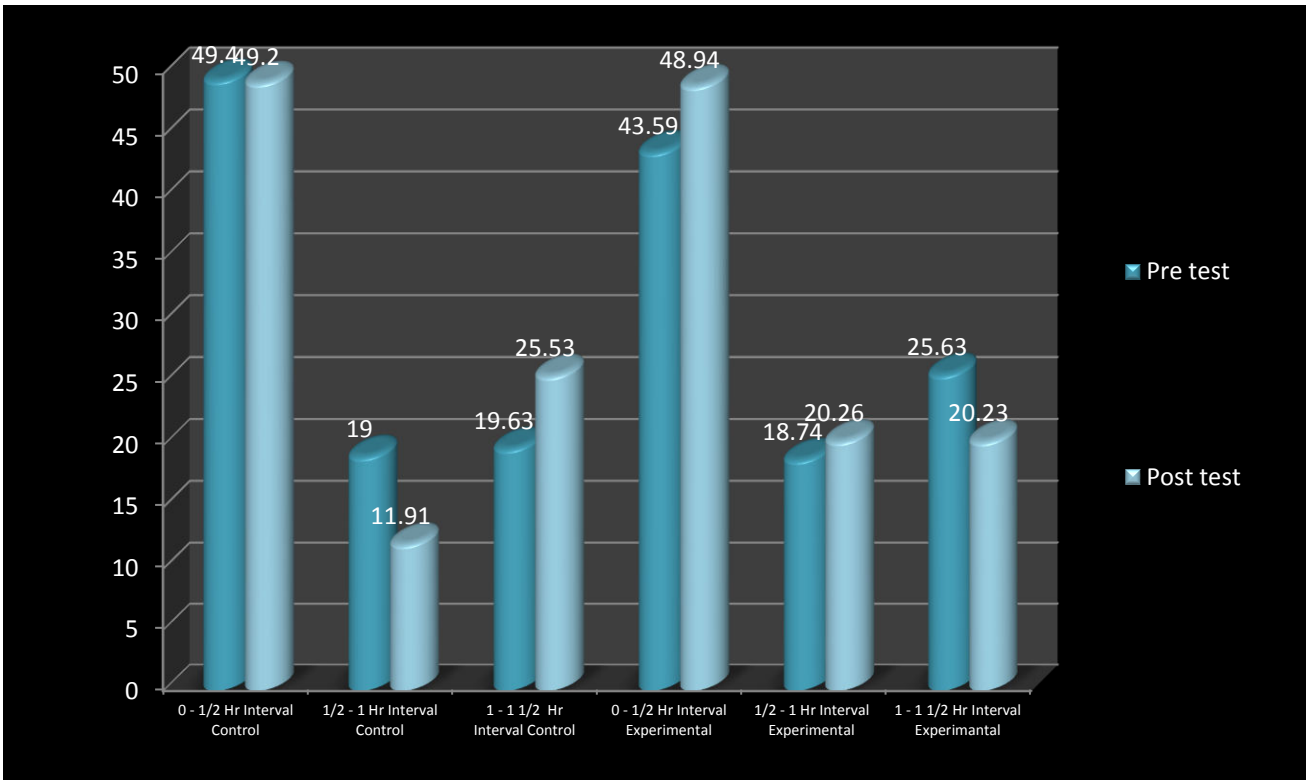


Table 6: The average time interval between the intake and output of the pre test and post test of control group and experimental group.

Group	Pre test/Post test	Average Time interval between intake and output in %				
		0 – 1/2 Hr	1/2 – 1 Hr	1– 1 ½ Hr	1 ½ – 2 Hr	2 – 2 ½ Hr
Control	Pre test	49.4	19.00	19.63	2.67	9.10
	Post test	49.2	11.91	25.53	3.40	9.34
Experimental	Pre test	43.59	18.74	25.65	6.79	4.21
	Post test	48.94	20.26	20.23	4.47	6.03

This table showed the children in the control and experimental group use to urinate within 1 ½ hr from the intake, and it shows there no much difference between the pre test and post of the control and experimental group.

Graph 6: 0 – ½ hr, ½ - 1 hr and 1 – 1 ½ hr of average time interval between intake and time of voiding of pre test and post test of control and experimental group.



Discussion

DISCUSSION

Toilet training is the mastery of skills essential for urinating and defecating in a socially acceptable time and manner. The occupational therapists have a major role in the toilet training for children with special needs. Various methods and techniques have been adopted by occupational therapists for toilet training. TEACCH is a teaching and education method for children with autism and related communication handicapped children. Evidence show that visual perception is superior in children with autism, they respond better to visual cues .This strategies was adopted in this study by providing visual cues along with appropriate toilet scheduling.

To start toilet training, the child should show some kind of readiness signs. Signs of intellectual and psychological readiness include, being able to follow simple instructions, cooperative, uncomfortable with dirty diapers and wanting them to be changed, recognizing when he has a full bladder, able to tell when he needs to urinate, asking to use the potty chair and to wear regular underwear. Most children show signs of physical readiness to begin using the toilet as toddlers, usually between 18 months and 3 years of age (**Vincent Ianneli,2004).** This consideration was followed in this study, i.e, one of the inclusion criteria was that the child showed some kind of readiness signs.

According to Carolina curriculum, the child usually indicates the need to toilet at the age of 2-2.5 years, uses toilet by self, develops at the age of 3 years. This also considered as the inclusion criteria for age group in current study.

The current study was conducted in the Occupational Therapy department of Kovai Medical Center and Hospital, Coimbatore and also in special schools and centers in and around Coimbatore. This study has included the Autistic children who have poor indication of toileting (urine) in the Age group 3- 5 yrs. The mean age group for control group(4.09) and experimental group(3.6). Control and experimental group have been undergoing occupational therapy(sensory integration, cognitive perceptual training, play therapy, group therapy), speech therapy(Muscle training, oral exercise, stimulatory training to improve prelinguistic skills) and special education. The experimental group along with this conventional therapy visual cue based toilet training was given. The conventional therapy did not include any visual cue based communication training. One of the children from the experimental group

was withdrawn from the study as the child became sick. There were 10 children in the control group and 9 children in the experimental group.

Visual cue based toilet training was individually designed to each child according to their modified baseline schedule. Eg A child who urinated every 2 hourly(approximately) was taken to the toilet every 2 hourly and before going to the toilet the mother showed the visual cue (picture of the toilet) informed the child that he or she is going to urinate and taken to the toilet.

The study done by Bopp, K.D., et al. in 2004, Visual cues may be created using photographs, pictures, written words, or physical objects. They communicate clear expectations for the child and decrease the need for constant adult involvement in the activity. In the current study, the investigator used picture of toilet for better recognization and association. The investigator used either Indian type or western type or both types of toilet picture.

The study done by Quill in 1997, Schuler in 1995, Tubbs in 1996, the research and clinical literature indicates that people with autistic spectrum disorder learn and function more effectively using visuals as compared to verbal information. This parallels with current study results, illustrated in Table 1 & Table 2.

The table 1 showed Odd's ratio between pre test of the control and experimental group based on the indication and no indication of toilet needs. It shows the odd ratio value 7.58, is greater than 1 which indicates, that the control group children indicates bladder needs more than experimental group in the pre test.

Table 2 shows Odd's ratio between post test of the control and experimental group based on the indication and no indication of toilet needs. This table shows the odd ratio value 0.01 is lesser than 1, indicating the event occurs less likely in the control group. This means that the control group children indicate voiding very less than experimental in the post test. From the table 1 and 2, the ratio between the control group and experimental group for indication of toilet needs is 1:0.154 & 1:25.4 for pre and post test respectively. Comparing the experimental group with control group (control group: experimental group) is clear that indication of toilet needs was 0.154 times prior to therapy, this has increased to 25.4 times after therapy. This improvement in indication of toilet needs in experimental group can be directly attributed to the visual cue based toilet scheduling.

This result also supported by Bryan, L.C., and D.L. Gast in 2000, in their study most behavioral problems associated with children with autism seem to stem from poor communication. While visual cues can be useful at home, they may be especially useful for children transitioning into a school environment. Visual cues facilitate communication and therefore may minimize behavioral problems.

As mentioned earlier all the children taken for this study could exhibit a readiness cues. Mothers have habituated to the routine of taking the children to the toilet as soon as they exhibit the readiness cues. In the toilet schedule chart it was recorded as voiding in toilet. This does not mean that the child showed appropriate method of indication. When the child had inconsistent readiness cues the child voids in his pants. This was recorded as voiding in pants.

Table 3 showed odd's ratio between pre test of the control and experimental group based on the voiding on toilet & pants. This table shows the odd ratio value 1.63 is greater than 1 it indicates that the children who were in control group more often goes to toilet to void than the experimental group in the pre test.

Table 4 showed Odd's ratio between post test of the control and experimental group based on the voiding on toilet & pant. This table shows the odd ratio value 0.12 is lesser than 1 it indicates the children who were in experimental group more often goes to toilet to voiding than the control group in the post test.

Comparing tables 1, 2, 3 & 4 it is shown that,

1. Children in experimental group had indicated less about their toilet needs and had more toilet accidents during initial the assessment.

2. After visual cue based toilet scheduling, those children started indicating toilet needs more often and had less toilet accidents than the control group children.

The current study findings was supported by a study conducted by **Tsuey- ling lee** on **TEACCH supported individualized education program in mentally retarded children and autistic children, in national Hsin-chu University of education(2005)**, the researcher examine the TEACCH program in three case studies, one of whom had mental retardation and two of whom have autism. Observation, interviews, records and IEP (individualized education program) were used for eliciting the students present level of performance and

unique needs. One of the objective was, use a card and/or picture to indicate his needs to use the toilet and reduce the accidents. Result of this study indicates that, this objective was achieved as 75% by the child.

Table 5 and graph 5 showed the average time interval between the voiding of pre test and post test of control group and experimental group. These values used to interpret the regularity in the time duration between voiding. Nearly 65-70% of the children in the experimental and control group used to urinate in 1 – 2 and 2 – 3 hr of interval. The values are given in the below table,

Group	Pre/post test	Average time interval between voiding in %	
		1-2 hr	**2-3hr**
Control	Pre test	30.25	32.4
	Post test	17.33	52.2
Experimental	Pre test	39.04	28.7
	Post test	42.46	25.54

This table shows there is more difference in the pre and post test value of control group in 1-2 hr & 2-3 hr interval. It shows no regularity in voiding of the children who were included in the control group. In the experimental group the pre test value & post test value have only a slight change. This shows there is regularity of voiding developed in children after the visual cue training in experimental group.

Consistent interval in voiding of experimental group can be attributed to their structured schedule, which was based on their bladder tolerance.

Table 6 shows the average time interval between intake of fluid and voiding. Approximately 50% (43-49%) of time Children in experimental and control group had voided with in ½ hr after an intake. This did not change from pre test to post test. 19-25% of time children had voided between ½-1 ½ hr duration. This also had not changed in post test. This gives the insight that most of the time children had the tendency to void within ½ after food and whatever the bladder tolerance is, it remained constant over the study period.

This insight would be useful in planning toilet scheduling for children. Plan to take the child to toilet within ½ hr after having food.

The visual support cue intervention, can have an effect on indication of toilet needs, control of voiding etc but not on the bladder tolerance. This is evident from the above mentioned results (table 6).

Few of the feedbacks provided by the parents are,

One child had started to void in the bathroom independently without cues

One another child had started to pick up the visual card, even though he does not show it to the mother.

The occurrence of picking up the visual support and showing it to mother had increased, but inconsistent.

Few parents were apprehensive about the visual support cue, whether their child will dependent on visual support cue and not to move on to develop verbalization. One mother refused to participate in the study because of this reason, one another mother after much assurance she agreed to participate in the study. It was reported that one of the draw back of TEACCH method- visual cue is that it does not emphasize on verbalization**, (www.Autism.com).** But in this study the mothers were instructed to show the visual card and verbalize specific word (for voiding) in regional language before taking to the toilet.

The current study summarizes that visual support cue have a significant effect in indication of toilet needs in children with autism, thus supporting the hypothesis. Also, it has an effect on reduction of accidents and regularity of voiding.

Conclusion

CONCLUSION

- The study was proposed to find out the effectiveness of visual support cues in indication of toilet needs among children with autistic disorder.
- The result of the study favored the alternate hypothesis by showing difference in the indication after the intervention.
- The visually supported cue method seems to be an effective way to communicate and indicate voiding among children with impaired communications.
- Occupational therapists can teach the visual supporting cue to the parents of children with autism who have difficulty in verbal communication.
- The visual supporting cue technique can be effectively administered by parents with guidance of occupational therapists at home to train their children.

Limitations & Recommendations

LIMITATION AND RECOMMENDATION

The results of the current study show improvements in indication of toilet needs in children with Autism.

The subjects were assigned using purposive sampling and the sample size was too small to generalize the study results. This calls for further studies with random sampling as well as a larger sample size.

Physiological variations such as fever and temporal variations such as climate changes were not considered in this study which affects the toilet schedule during the assessment time.

Brazelton 1999 said that Toilet readiness is a combination of both child and parent willingness to participate in toilet training, the parent responds to the child's readiness cues. Unless the parents in this study the mothers follow the training schedule, the mothers follow the training schedule, the therapy will not be effective. In this study the investigator guided the mother on what and how to do, and structured the schedule. But it was only assumed that mother followed the schedule consistently and reports given were truthfully recorded.

The results show that TEACCH method was effective in indication of toilet needs for autistic children, so based on these result this visual cue method can be encourage to use in other self care activities for autistic children to develop their communication.

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